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SUBJECT : Test and Evaluation Report  
Wide Field High Power Anamorphic Stereoviewer  
Dated May 1974

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## TECHNICAL PUBLICATION

# TEST AND EVALUATION REPORT

## WIDE FIELD HIGH POWER ANAMORPHIC STEREOVIEWER

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NPIC/R-16/74

MAY 1974

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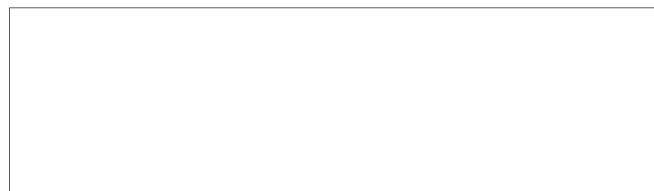
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TECHNICAL PUBLICATION

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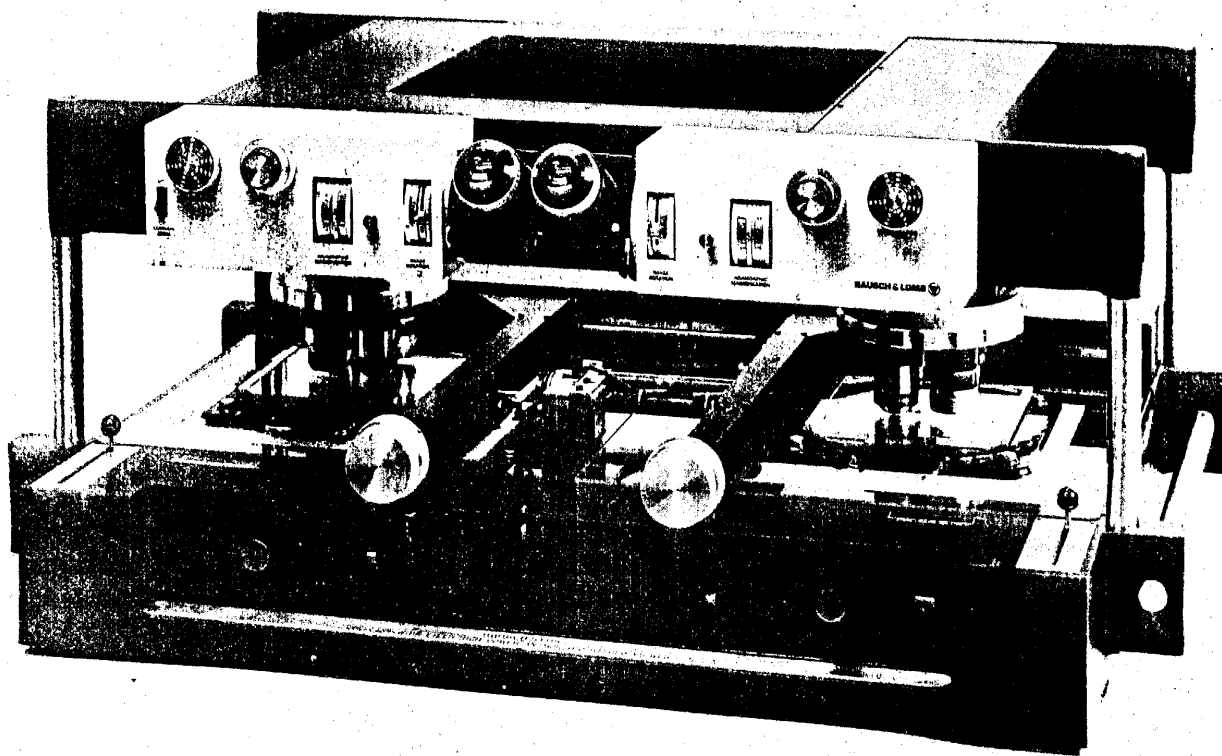


Figure 1. Wide Field High Power Anamorphic Stereoviewer

## WIDE FIELD HIGH POWER ANAMORPHIC STEREOVIEWER

### 1. INTRODUCTION

The Wide Field High Power Anamorphic Stereoviewer (WFHPAS) is a prototype instrument to be used for the analysis of high resolution photography at high magnifications and yet have an extremely wide field so the operator may examine the subject in context with its surroundings.

It has continuously variable magnification from 10X to 180X, anamorphic magnification from 1X to 2X, 360° image rotation, and 40° stage rotation. Main features, aside from the high resolution and high magnification, are the extremely flat field optics, 72° angular field of view, common zoom, and common stage motion.

STATINTL The WFHPAS was delivered to NPIC on 26 April 1973. This report summarizes findings from acceptance testing, engineering testing, and operational evaluations, including those conducted by [redacted] and several photointerpreters representing IAS, IEG, DIA, and SPAD.

The WFHPAS is shown in Figures 1 and 2.



Figure 2. WFHPAS Operator Controls

## 2. SUMMARY OF TEST RESULTS

### Operational Test Results

The following statements are summarized from [ ] studies made on the WFHPAS (DK-1048 - The Effect of Display Field Size on Interpreter Performance):

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The optimum angular field of view for search tasks is 36°. Angular field of the WFHPAS is 72°.

For order of battle readout, the optimum angular field is 54°. No further improvement is gained by the 72° field of the WFHPAS.

Note: In this report (DK-1048) [ ] did not attempt to evaluate the effectiveness of the wide fields in interpretation of objects in context with their surroundings. The degree of effectiveness was evaluated by several photointerpreters over several months use of the WFHPAS.

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The following comments are summarized from both written and verbal reports received from photointerpreters:

Twenty of 26 PIs (IEG) surveyed perform search tasks regularly. The remaining six do detailed study regularly. Only one of these six said that the wide field (72°) gave continuity to his task. The other five made only very general statements as "it helps" or "it gives good quality viewing over a wide area."

Of the 20 who perform search tasks regularly, 11 stated some very generalized benefit with the wide field of view. One PI believed that the wide field was not generally needed for detailed study.

Comments about the main features:

Magnification Range - Sufficient or more than enough.

Light Intensity - Enough to questionable with very dense imagery.

Common Stage Motion - Useful (by most) to marginal benefit.

- Common Zoom - Useful.
- Anamorphic Magnification - Six believed it useful, three others not useful.
- Film Stages (Loading) - Considered by most as worst feature.

The summary of comments from technical representatives of IAS, DIA, and SPAD was that the WFHPAS is very nice but not cost effective.

#### Test Results

The following tabulation summarizes results of acceptance and engineering tests.

- Magnification - 10X to 180X (within 5%).
- Field of View - 370 mm divided by total magnification (2.06 mm at 180X).
- Image Quality (Compared to Twin Dynazoom) - No bothersome distortion, field curvature, lateral or longitudinal color. In actual viewing tests, the image quality is not statistically different than that of the Twin Dynazoom (DK-1049).

On-Axis Resolution (High Contrast - Both optical paths are essentially of the same resolution)	Magnification	Line Pairs/mm	
	(X)	Specified	Measured
	180	1080	1008
	95	758	722
	50	450	400
	20	195	200
	10	100	102
Off-Axis Resolution - (High Contrast, at .8 FOV)	180	915	850
	95	650	635
	50	382	360
	20	165	115
	10	82	60

Off-Axis Resolution	-	180	700	650
(High Contrast, edge		95	490	400
of FOV)		76	410	320
		72	400	330

Note: All readings above are the median value of three observations. On-axis readings at 10X and 20X were made using a 3X Diopter Telescope.

Anamorphic Magnification - 1X to 2X (Measured), 1X to 2.2X (Specified).

Interpupillary Distance - 55 to 78 mm, 80 mm is the (Range) specified maximum.

Eye Relief - 15 mm.

Illumination Intensity - 12,000 foot Lamberts at 10X to 1,300 foot Lamberts at 180X. Was adequate to determine step separations on wedge up to 3.0 density.

Color Temperature - 3200 K, (2950 K was specified). (Through Optics)

Convergence Angle - 3° (1-1/2° per optical path). (Accommodative Distance) This corresponds to an accommodative range, with IPD variation of 76 mm to 55 mm, of from -.7 diopters (1.45 meters) to -1.0 diopters (1.0 meters).

Note: Although the fields of view converge to 3°, the usefulness to the observer is very doubtful. The reason is that the fields are so large that the edges of the fields are not seen when viewing toward the center. Therefore, the observer has no guide to determine the convergence of his or her eyes. For an instrument with smaller fields, as the Twin Dynazoom (40° angular fields), the fields do determine the convergence angle of the observer's eyes if the fields of view are superimposed.

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- Common Stage Motion - Provided by clutch coupling the x-y motions of both stages. Failed to work properly during 2 months use.
- Image Rotation - 360° for each path. At settings above 5 to 10° the prisms cause the stereo image to pull apart as the zoom is changed.
- Common and Independent Zoom - Clutch couples the independent zooms. Zoom remains in good focus over its range.
- Heat (Light Sources) - No damage noted to 3.0 density film.
- Stage Platens - Keeps film within depth of focus of the 180X objectives.
- Objective Focus - Objectives are very parfocal. Coarse focus is adequate for all objectives. Fine focus control is not needed.
- Electrical Safety (Leakage Current) - Leakage current is less than .07 ma. (American Standard for Appliances is .5 ma.)
- Size and Weight - Width - 42 inches, Depth - 27-1/2 inches, Height - 17-1/2 inches, Weight - 260 pounds.
- Control Location Operation - Controls are properly located and labeled. Most difficult to use is the top glass platen. Fine focus control is not necessary. Anamorphic magnification and rotation controls are considered not as well placed as those on the Image Comparison Microstereoscope (ICM).
- Reliability Maintainability - Instrument is essentially maintenance free. Lubrication of moving parts is either not

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needed or is permanent. Lamp replacement has not been needed to date. Most optical surfaces can be cleaned; however, they are not easily reached.

#### Construction

- The WFHPAS is well designed. Rigid mounting of optics prevents bothersome image vibration noted in some other microscopes.

#### Mechanical Failures

- Certain minor failures were noted. Common stage motion clutch slips and drags. Glass platens come unglued (repeatedly) from rear hinge. (This problem was fixed in-house by the Equipment Performance Branch.) Fine focus drive belt slipped off the sprockets.

#### Operator and Maintenance Manual

- Clearly written and complete for routine needs.

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## 3. CONCLUSIONS

Although the WFHPAS met the major contractual specifications, the following additional factors should be considered in arriving at a decision to purchase a production version.

- Of the six IEG PIs who regularly perform detailed study, only one believed the WFHPAS gave continuity to his task. None of the six stated that more information could be gotten from the film by viewing through the 72° field of view as opposed to a 40° field (Twin Dynazoom).
- None of the PIs from IAS, SPAD, or from DIA reported any benefit of viewing with the 72° field of view.
- Present film quality can be resolved equally well with the Twin Dynazoom.
- Technical representatives from IEG believe the anamorphic magnification capability is of questionable value. This is because the resolution of the imagery generally is poor at points where anamorphic correction is needed.
- The 15X wide field eyepieces (59°) will soon be available. These eyepieces, which are being made especially for the Zoom 240, can also be used in the B&L Twin Dynazoom. This increases the angular field of the Dynazoom from 40 to 59°. Field curvature with the 15X eyepieces is slightly worsened, but it is considered useable. This means that the Twin Dynazoom may meet most needs for a wide field of view, high magnification, and high resolution.
- Cost per production copy, although not firmly quoted, would probably be high for a small number of copies. Most people who evaluated the WFHPAS believed the instrument not to be cost effective.

Certain minor mechanical deficiencies are considered easily correctable. These include the common stage motion clutch, which slips, and the glass platens, which come unglued from the hinges.

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